

# GWYNNS FALLS SEWERSHED STUDY

## SMOKE TESTING PROTOCOL

DATE REVISED 12/11/07  
VERSION: 2.1

### General

Each smoke testing crew will be assigned a smoke testing area. The crew will be responsible for smoke testing all sewer segments located in their assigned area with the exception of the following:

- A. All 15-inch diameter and larger sewers
- B. All sewers located on property owned by the Baltimore City Department of Recreation and Parks

URS will coordinate with each crew and will provide all necessary advanced public notifications. However, each inspection crew leader will be responsible for daily coordination with City agencies as required.

### Smoke Testing Crew Responsibilities

1. The crew will complete all smoke tests using the smoke testing software provided by URS. All tests will be completed using the attached standard naming convention.
2. Each inspection crew will have a minimum of two (2) field inspectors, including one (1) team leader. Each crew member will wear orange safety vests and carry sufficient identification.
3. Crew will provide to each inspection crew an informational poster (36"x24") as shown in the attached. Each crew will display the poster immediately adjacent to the blower location.
4. Each inspection crew will keep a copy of all pertinent Material Safety Data sheets (MSDS) and the attached smoke testing flyer and door hanger notifications with them at all times and will make all sheets available to any requestor. Additionally, each crew member will keep a copy of the attached Field Work Authorization letter with them at all times.
5. The crews will provide and operate blowers and smoke generators for performing all assigned smoke tests. The crew will furnish all smoke inspection documentation including field notes and/or sketches.
6. On the day of the smoke test, URS will e-mail a notification reminder to City agencies/officials and include the cell phone number of the crew team leader. The team leader is responsible for answering all inquiries associated with the respective smoke test. Inquiries regarding general project-related issues will be forwarded to URS.

# GWYNNS FALLS SEWERSHED STUDY

## SMOKE TESTING PROTOCOL

DATE REVISED 12/11/07  
VERSION: 2.1

### Products

1. Smoke will be generated from Hurco's LiquiSmoke™ or Cherne's Fluid Smoke liquid smoke solution.
2. Smoke test blower will be a high volume air blower capable of producing a minimum capacity of 1,700 cfm. The blower base will be gasketed with foam or other suitable sealing material to restrict the escape of smoke from between the manhole structure and frame and blower.
3. Inflatable sewer plugs, sandbags, or other air flow restrictors or baffles will be used to isolate sewer segments for smoke testing. The crew is responsible for completely removing all plus, sandbags or flow restrictors. The team leader will immediately notify the City of Baltimore One Call Center (311) if a plugging device is flushed into the sewer.
4. All pictures will be recorded using a digital camera. Cameras will have a minimum 3x zoom. All photographs will be in JPG format with a resolution of 800x600 at 72 DPI.

### Smoke Testing Procedure

1. Smoke tests will be performed only during dry weather. Each day before the inspection crews begin work, the crew will review the weather conditions from the previous calendar day. Weather condition data is available on the following internet web site:

<http://www.wunderground.com/weatherstation/WXDailyHistory.asp>

If the rainfall intensity was equal to or greater than 0.15 in/hr for a duration of one (1) hour **or** the total daily rainfall was equal to or greater than 0.3 inches, smoke testing will be delayed for a minimum of one calendar day. See attached example.

2. Smoke tests will be completed on sewers that are half full or less. The crew may request a copy of the Manhole Inspection Application Software to assist in determining the flow level.
3. Sewers located in residential backyards and/or common areas will be tested. In these situations, the crew will smoke test from the nearest manholes located in a street or alley when possible.

# **GWYNNS FALLS SEWERSHED STUDY**

## **SMOKE TESTING PROTOCOL**

DATE REVISED 12/11/07  
VERSION: 2.1

4. The minimum smoke blowing time duration will be 5 minutes. The blowers and the smoke injection should begin simultaneously and be continuous for the entire inspection duration.
5. The maximum length of sewer segment to be tested will be approximately 1,000 linear feet. A maximum of three (3) sewer segments with a combined length of approximately 1,000 linear feet may be tested. If three segments will be combined in one test, the crew will operate two blowers.
6. Storm drain inlets, curb boxes, cleanouts, building laterals, downspouts, areaway drains, foundation drains, and other potential sources of smoke will be visually inspected.

### Private Property Access

1. It is expected that inspections will be completed of the entire perimeter around each building connected to the sewer, including residential yards and common areas. Inspectors will exercise reasonable judgment when entering private property. Following are examples of common field issues and suggested action items:
  - a. Fenced area – record observation from the fence line. Pictures will be taken using the camera’s zoom feature
  - b. Dogs present – if leashed, record observations from a safe distance. If not leashed, do not enter property.
  - c. Brush or hedge surrounding area – record observation from the fence line. Picture will be taken using the camera’s zoom feature
  - d. Access through poison ivy – do not enter property

At a minimum, an observation (regardless of access issues) shall have a record with an associated comment to explain the site condition that prevented completing the observation.

2. Before entering private property, the inspector shall attempt to contact the property owner (for private residences, knock on the front door or use door bell) or office manager (at the discretion of the inspector).
3. Advanced smoke testing notification flyers and door hangers will be distributed to affected property owners instructing them how to prepare for the smoke tests. However, it is possible that smoke may still enter a building through the plumbing connections. In these circumstances the crew shall instruct the property owner to open all windows for ventilation and to recommend that the owner contact a licensed plumber to check for faulty plumbing fixtures and connections. Entering a building will be at the team crew leader’s discretion. It is expected that the

# **GWYNNS FALLS SEWERSHED STUDY SMOKE TESTING PROTOCOL**

DATE REVISED 12/11/07  
VERSION: 2.1

smoke testing will continue until all observations have been recorded; however, test abandonment will be left to the discretion of the crew team leader. If a smoke test is abandoned, the team leader will record the property owner's name, property address and the estimated footage of sewer length inspected. This information will be recorded in the surveyor's field book described in Recording Observations, Item 1.

# GWYNNS FALLS SEWERSHED STUDY

## SMOKE TESTING PROTOCOL

DATE REVISED 12/11/07  
VERSION: 2.1

### Recording Observations

1. Identifying a recordable observation will be left to the discretion of the inspector. However, any location dissipating light smoke is considered a recordable observation.
2. After smoke injection, each inspector will observe the smoke dissipating from the ground directly above the sewer alignment. If any smoke is evident, the inspector will record this observation including the following details:
  - a. Amount of smoke (i.e. light, medium or heavy) dissipating along the sewer alignment
  - b. General condition of ground cover over sewer alignment (i.e. cracked asphalt, severely cracked asphalt, brush, large trees, etc.)
  - c. A picture will be taken from a location approximately ten feet perpendicular from the sewer alignment

The team crew leader will record field notes/comments in a land surveyor field notebook. Pertinent field notes/comments include:

- a. Test ID
  - b. Date
  - c. Crew Leader Initials
  - d. Equipment issues (blower condition, plug condition, etc.)
  - e. Condition of manhole covers and frames (i.e. broken cover, loose frame, etc.)
2. Each observation will include the following digital photographs:
  - a. Landscape photograph of observation with placard (see attached template)
  - b. Portrait or landscape photograph for observations where the source of the dissipating smoke cannot be clearly identified. This photograph will be recorded after the smoke has dissipated.

### Smoke Test Scheduling

1. Each smoke testing crew will provide to URS the following schedules:
  - A. Three week schedule identifying the flowmeter basin where smoke testing is anticipated to be performed
  - B. Weekly schedule identifying all test locations anticipated to be completed
  - C. Three day schedule identifying all test locations anticipated to be completed

# GWYNNS FALLS SEWERSHED STUDY

## SMOKE TESTING PROTOCOL

DATE REVISED 12/11/07  
VERSION: 2.1

### Invoicing

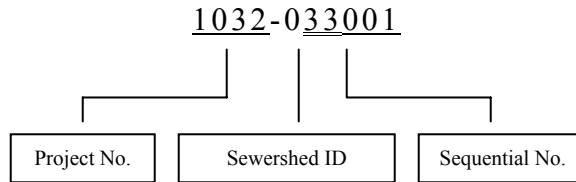
1. Smoke tests will be paid at the contract unit rate per linear foot of sewer inspected. The sewer segment length will be based one of the following at the discretion of the crew:
  - d. Length recorded in the City's geographic information system (GIS)
  - e. Measured length between the manholes identified in the smoke test report. All measurements will be taken from the center of each manhole and recorded in linear feet.
2. URS will field verify all measured lengths that differ (+/-) from the GIS length by more than ten percent. To expedite invoice processing, URS will verify the measured length after the invoice has been submitted for payment. If URS confirms that the inspections forage is incorrect, the smoke testing crew will provide a credit on the subsequent invoice for the footage difference.

# GWYNNS FALLS SEWERSHED STUDY SMOKE TESTING PROTOCOL

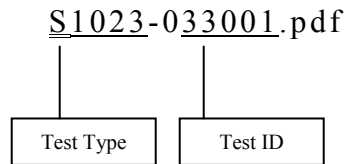
DATE REVISED 12/11/09  
VERSION: 2.0  
AUTHOR: PDS

## Standard Naming Convention

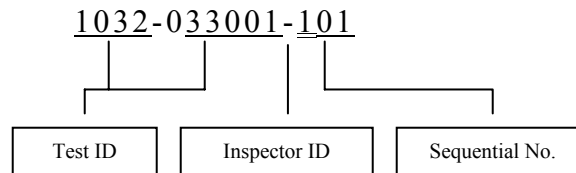
Test ID:



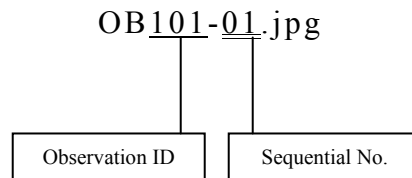
Report ID:



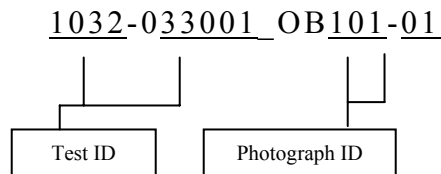
Observation ID



Photograph ID:



Photograph Filename:





## **PLEASE READ**

### **Notice to All Residence**

Baltimore City Is Sending Smoke Signals

TYPICAL SMOKE OUTLETS



In order to improve your sewer service, the sanitary sewer pipes near your home will be inspected for possible water leaks by means of smoke testing.

Smoke testing can help locate defect connections that home/business owner or occupants may not know exist.

The smoke testing will take place over the next \_\_\_ days with work scheduled to begin each day at 9:00 A.M and end no later than 5:00 P.M.

The test will be conducted by URS under contract with the Baltimore City Department of Public Woks (DPW).

During the smoke test, workers will force a HARMLESS, NON-TOXIC FOG into the sewers in your area to locate system defects. This fog, which resembles smoke, has a slight odor but is safe and disappears quickly once doors or windows in your home are open for a short time following this occurrence.

*(Turn Over For More Information)*



To prepare for smoke testing, pour a cup or more of water into each floor drain and sink drain or run the faucet for a few minutes the night prior to smoke testing.

If someone in your home/business is homebound or has a respiratory condition, please call Tonorah Houston at the Baltimore City Dept. of Public Works (410) 396-3440, and leave your name, address and phone number so that a supervisor may contact you prior to testing to further discuss your situation and ensure the comfort and safety of yourself and other such persons.

During testing, smoke may enter your home/business through drains. Smoke may escape from the vent pipe on the roof of your home/business, which is normal. **Smoke may enter your home/business if your plumbing is not in proper operating condition due to defects or your sink/floor drain traps do not have water in them.** If traces of smoke are detected in your home/business, there is a possibility that lethal or explosive gases from the sewer system could also be entering the building. If this situation occurs, the City of Baltimore strongly advises you to contact a licensed plumber as soon as possible to check for faulty plumbing fixtures and take appropriate measures to repair defects.

If smoke enters your home/business, open windows for ventilation and the smoke should disappear quickly. **Please contact the crew manager working in your area to let them know smoke has entered your home/business. (Name and phone # of Field Supervisor for URS)** Personnel will be available to assist you in locating the source of the smoke.

If you have additional questions, please call the Herring Run **Baltimore City Department of Public Works, Project Manager –Tonorah Houston, at (410) 396-3440.**



# GWYNNS FALLS SEWERSHED STUDY SMOKE TESTING PROTOCOL

DATE REVISED 12/11/09  
VERSION: 2.1  
AUTHOR: PDS



CITY OF BALTIMORE  
SHEILA DIXON, Mayor



DEPARTMENT OF PUBLIC WORKS  
BUREAU OF WATER AND WASTEWATER

## Smoke Testing Frequently Asked Questions

In order to improve your sewer service, the sanitary sewer pipes near your home will be inspected for possible water leaks by means of smoke testing.

Smoke testing can help locate defective connections that home/business owners or occupants may not know exist.

The tests will be conducted by URS, under contract with the Baltimore City Department of Public Works (DPW). Note, smoke testing will not be done during or immediately after rain storms because smoke will not travel through water-soaked ground.

Below are frequently asked questions about the process. **If you have additional questions, please call the Baltimore City Department of Public Works Gwynns Falls Project Manager, Tonorah Houston at (410) 396-3440.**

### **Q. What is smoke testing and why is it conducted?**

A. Smoke testing is the process of using a gas-powered blower to force a harmless non-toxic fog, which resembles smoke, into the sanitary sewer lines to locate water leaks. The smoke will be noticeable wherever there is a leak in a sanitary sewer pipe. The City of Baltimore Department of Public Works is conducting smoke tests as part of an on-going program to detect leaks within the sewer collection system. Locating and correcting these problems will greatly reduce the possibility of sewage backups or overflows occurring.

### **Q. Is the smoke harmful?**

A. **NO.** The smoke has a slight odor and may make you cough, but it is not harmful to people or pets. It will not damage your plants, clothing or furnishings. The smoke leaves no residue or stains.

### **Q. Will smoke come into my home/business and if so, what should I do?**

# GWYNNS FALLS SEWERSHED STUDY

## SMOKE TESTING PROTOCOL

DATE REVISED 12/11/09  
VERSION: 2.1  
AUTHOR: PDS

**A.** Smoke **may** enter your home/business through drains—for example, washing machine drains. Smoke may also escape from the vent pipe on the roof of your home/business, which is normal. Smoke should exit the vent stacks of the surrounding properties within the testing area. ***Smoke may also enter your home/business if your plumbing is not in proper operating condition due to defects or because your sink/floor drain traps do not have water in them.*** If traces of smoke or its odor are detected in your home/business, there is a possibility that lethal or explosive gases from the sewer system could also be entering the building at other times. Sewer gases can be dangerous, and some of these gases have no odor or color, and can enter a building undetected. If smoke from these tests does enter your home, Baltimore City Department of Public Works strongly advises you to contact a licensed plumber as soon as possible to check for faulty plumbing fixtures and take appropriate measures to repair defects.

If smoke enters your home/business, open windows for ventilation and the smoke should disappear quickly. Please identify and contact the crew working in the area to let them know smoke has entered your home/business. Personnel will be available to assist you in locating the source of the smoke. Please be certain to request and obtain proper identification from any city employee or contractor before allowing them to enter your home for further inspection.

### **Q. What should I do to prepare for smoke testing?**

**A.** As the possibility exists for smoke to enter your home/business via a defect in the sewer pipes, it is recommended to prepare your home/business as much as possible so that 'normal' non-defective drains will not permit entry of smoke.

A drain trap, the S-shaped curvature in the pipe typically found under sinks, exists to 'trap' a level of water and block sewer gases from entering the home/business. To prepare for smoke testing, pour a small amount (more than a cup but less than a quart) of water into each floor and sink drain or simply run the faucet for a few minutes the night prior to smoke testing. This will fill the traps and block the smoke. A dry trap will be found in drains which are not used regularly such as basement and garage drains. This can allow smoke to enter the home/business. Note, the existence in your home/business of seldom used floor drains, bathrooms, and deep sinks for dry traps and run water into them. If a sink is left unused for a period of time, traps will normally dry out.

If someone in your home/business is homebound or has emphysema, asthma, or other respiratory conditions, please call **Tonorah Houston** at the **Baltimore City Department of Public Works (410) 396-3440** and leave your name, address and phone number so that a supervisor can contact you prior to testing to further discuss your situation and ensure the comfort and safety of yourself and other such persons.

Your cooperation is also requested in notifying disabled or homebound persons in your neighborhood of these tests.

# GWYNNS FALLS SEWERSHED STUDY

## SMOKE TESTING PROTOCOL

DATE REVISED 12/11/09  
VERSION: 2.1  
AUTHOR: PDS

**Q. I will not be at home during the smoke testing and have pets in the house. What should I do?**

A. The smoke is not harmful to pets; however, leave several windows partially open for ventilation should any smoke enter the building. If you have proper connections and all of the traps have water in them, there should not be any problems.

**Q. Will the City require me to fix the plumbing in my home or business if smoke enters the building?**

A. Baltimore City will not require a property-owner to fix their plumbing unless the connection is considered an "illegal connection" as defined by the Baltimore City Code. Connections that allow groundwater or storm water to drain into the sanitary sewer system such as roof leaders and sump pumps are not permitted and will be reported to the appropriate City Agency for resolution.

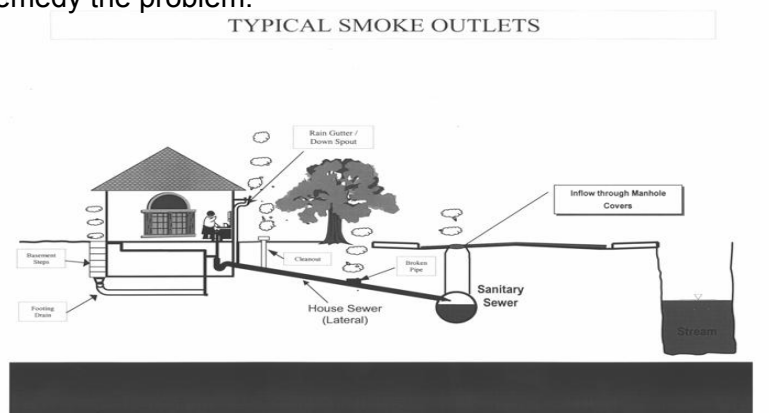
However, the City urges property-owners to seek the assistance of a licensed plumber to repair faulty plumbing fixtures as the possibility exists of lethal or explosive sewer gases entering the building.

**Q. Can the smoke block the sewers?**

A. **No.** The smoke is actually a fog made up of a vaporous substance and cannot clog a sewer pipe.

**Q What happens if the City finds a bad sewer?**

A. This information will be documented and given to the Bureau of Water and Wastewater and the City of Baltimore will be obligated to determine what steps are necessary to remedy the problem.



# GWYNNS FALLS SEWERSHED STUDY SMOKE TESTING PROTOCOL

DATE REVISED 12/11/09  
VERSION: 2.1  
AUTHOR: PDS



## History for KMDBALTI25

The Baltimore Sun, Baltimore, MD — Current Conditions

### Daily Summary for July 7, 2008

	Current:	High:	Low:	Average:
Temperature:	78.7 °F / 25.9 °C	78.7 °F / 25.9 °C	73.4 °F / 23.0 °C	75.3 °F / 24.0 °C
Dew Point:	73.5 °F / 23.1 °C	74.9 °F / 23.8 °C	71.9 °F / 22.2 °C	73.4 °F / 23.0 °C
Humidity:	84%	97%	84%	94%
Wind Speed:	1.0mph / 1.6km/h /	3.0mph / 4.8km/h	-	1.0mph / 1.6km/h
Wind Gust:	1.0mph / 1.6km/h /	6.0mph / 9.7km/h	-	-
Wind:	SW	-	-	SW
Pressure:	30.07in / 1018.2hPa	30.07in / 1018.2hPa	30.02in / 1016.5hPa	-
Precipitation:	0.58in / 14.7mm			

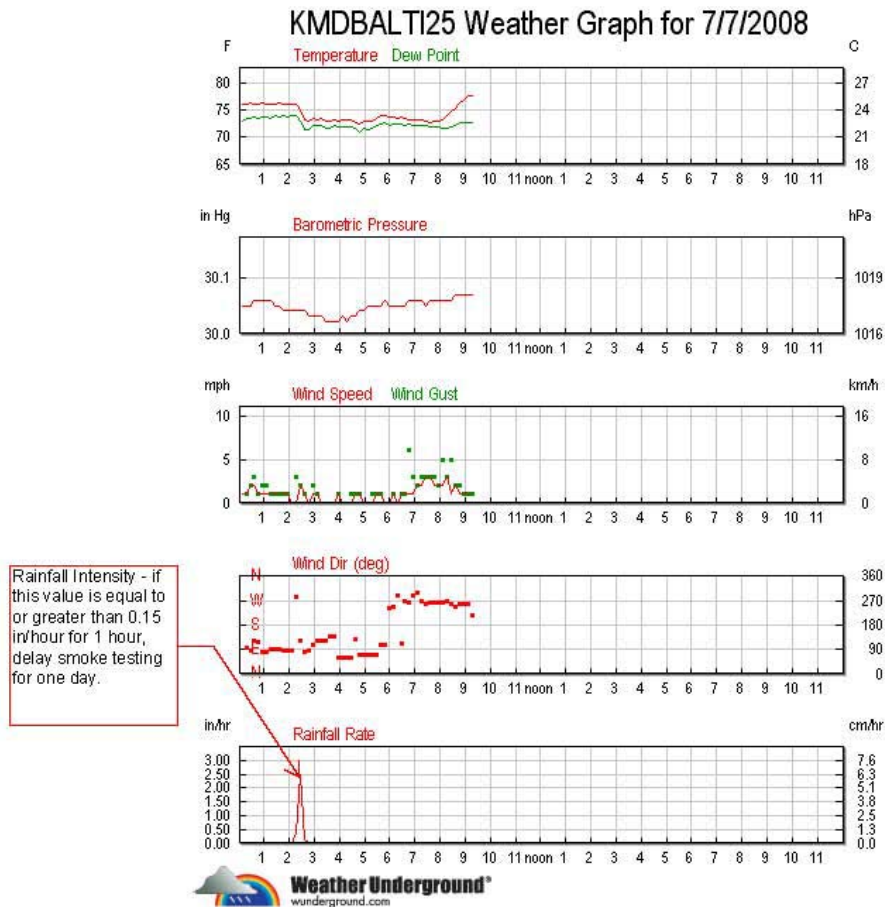
Statistics for the rest of the month:

Total daily precipitation - if this value is equal to or greater than 0.3 inches, delay smoke testing for one day.

	High:	Low:	Average:
Temperature:	94.1 °F / 34.5 °C	66.4 °F / 19.1 °C	78.0 °F / 25.5 °C
Dew Point:	74.6 °F / 23.7 °C	55.5 °F / 13.1 °C	65.9 °F / 18.8 °C
Humidity:	92.0%	34.0%	68.7%
Wind Speed:	7.0mph / 11.3km/h from the ESE	-	1.7mph / 2.8km/h
Wind Gust:	13.0mph / 20.9km/h from the WNW	-	-
Wind:	-	-	SSW
Pressure:	30.07in / 1018.2hPa	29.84in / 1010.4hPa	-
Precipitation:	0.12in / 3.0mm		

# GWYNNS FALLS SEWERSHED STUDY SMOKE TESTING PROTOCOL

DATE REVISED 12/11/09  
VERSION: 2.1  
AUTHOR: PDS



**Tabular Data for July 7, 2008**

Time	Temperature	Dew Point	Pressure	Wind	Wind Speed	Wind Gust	Humidity	Rainfall Rate (Hourly)
00:07	77.0 °F / 25.0 °C	73.8 °F / 23.2 °C	30.05 in / 1017.5hPa	NE	1.0mph / 1.6km/h	2.0mph / 3.2km/h	90%	0.00in / 0.0mm
00:17	77.1 °F / 25.1 °C	74.3 °F / 23.5 °C	30.05 in / 1017.5hPa	East	1.0mph / 1.6km/h	1.0mph / 1.6km/h	91%	0.00in / 0.0mm
00:27	77.2 °F / 25.1 °C	74.4 °F / 23.6 °C	30.05 in / 1017.5hPa	East	2.0mph / 3.2km/h	2.0mph / 3.2km/h	91%	0.00in / 0.0mm
00:37	77.1 °F / 25.1 °C	74.6 °F / 23.7 °C	30.06 in / 1017.6hPa	SE	2.0mph / 3.2km/h	3.0mph / 4.8km/h	92%	0.00in / 0.0mm
00:47	77.0 °F /	74.5 °F /	30.06 in /	ESE	1.0mph /	1.0mph /	92%	0.00in /



Subconsultant  
Company Logo

BALTIMORE CITY  
PROJECT NO. 1032  
GWYNNS FALLS SEWERSHED STUDY  
SMOKE TEST OBSERVATION

1032-\_\_\_\_\_-\_\_\_\_\_